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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,815	07/30/2003	Tsutomu Ohzuku	43888-267	9492

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EXAMINER	
LEE, CYNTHIA K	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
05/26/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/629,815	OHZUKU ET AL.	
	Examiner	Art Unit	
	CYNTHIA LEE	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-9,14 and 16-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-9,14 and 16-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Response to Amendment

This Office Action is responsive to the arguments filed on 3/23/2010. Claims 1, 3-9, 14, 16-18 are pending.

Applicant's arguments have been considered. Claims 1, 3-9, 14, 16-18 are finally rejected for reasons stated herein below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-8, 14, 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzuku (Layered Lithium Insertion Material of $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ for Lithium-Ion Batteries, Chemistry Letters 2001, the Chemical Society of Japan, pgs 642-643, CL-010390) in view of Ohzuku (JP 2002-042813, relying upon the English equivalent US 6551744 for translation).

Ohzuku '390 discloses a positive electrode material comprising the formula $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ (see Abstract).

Ohzuku '390 does not expressly disclose the crystal structure of the above formula as claimed by the Applicants in claims 1, 3, 4 and 6-8. The Examiner notes that while the prior art does not explicitly teach these properties, these are considered

inherent in the prior art barring any differences shown by objective evidence between the positive electrode material disclosed in the prior art and the applicant. As the positive active material taught by the prior art and the applicant are identical within the scope of claims, 1, 3, 4, 6-8, Ohzuku '390 inherently teaches the crystalline properties as claimed by the Applicants. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999). The courts have held that claiming of a property or characteristic which is inherently present in the prior art does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). See MPEP 2112 and 2112.01.

When the Examiner has provided a sound bases for believing that the products of the applicant and the prior art are the same, the burden of proof is shifted to the applicant to prove that the product shown in the prior art does not possess the characteristics of the claimed product. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Ohzuku '390 does not disclose that the nickel, manganese, and cobalt elements are uniformly dispersed at the atomic level (Applicant's claim 1). Ohzuku '813 teaches of making a metal oxide as positive electrode materials by coprecipitation method. Coprecipitation is a technique for obtaining a composite hydroxide by simultaneously precipitating two different elements in an aqueous solution utilizing a neutralization reaction. Until now, the conventional coprecipitation process sufficed for the purpose, since only a portion of the nickel had to be replaced by a small amount of other

element. However, if nickel element and manganese element are to be incorporated in substantially the same amounts to form a solid solution at the atomic level, as in the present invention, the conventional method cannot serve the purpose and more advanced techniques are required. Further, when the intended lithium-containing composite oxide is obtained by causing a hydroxide obtained by precipitation to react with lithium, a large difference occurs in the electrochemical properties depending on the particle shape when the oxide is used for a battery. With the conventional method, it is difficult to control the difference (6:53-7:10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the metal oxide of Ohzuku '390 by the coprecipitation method for the benefit of controlling the difference in the electrochemical properties of the metal compounds.

It is noted that Applicants also use the coprecipitation method to produce positive electrode material. The instant Specification pg 24 states that:

"First, the coprecipitation in step (a) is the method primarily to obtain a composite hydroxide by simultaneously coprecipitating a plurality of elements in an aqueous solution through neutralization reaction. In the case of using nickel, manganese and cobalt, since manganese is prone to be oxidized, manganese is sufficiently oxidized into trivalent manganese ions even by a trace amount of dissolved oxygen present in the aqueous solution. As a result, its dispersion and formation of solid solution at the atomic level is insufficient. The point of this step is to produce a double hydroxide or triple hydroxide by allowing nickel, manganese and cobalt elements to be present in one layered hydroxide without separation." (emphasis added)

Thus, the forming the positive electrode material using the coprecipitation method of Ohzuku '813 inherently forms nickel, manganese, and cobalt elements being "uniformly dispersed at the atomic level" as claimed by Applicants in claim 1.

Regarding claim 14, Ohzuku '390 discloses a $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ electrode, but does not disclose a negative electrode material capable of absorbing and desorbing lithium ions and/or metal lithium and an electrolyte. Ohzuku '813 teaches a negative electrode material capable of absorbing and desorbing lithium ions (14:58-60) and an electrolyte (17:26-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a negative electrode material capable of absorbing and desorbing lithium ions and/or metal lithium and an electrolyte to the positive electrode material of Ohzuku '390 for the benefit of generating electrical power.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzuku (Layered Lithium Insertion Material of $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ for Lithium-Ion Batteries, Chemistry Letters 2001, the Chemical Society of Japan, pgs 642-643, CL-010390) in view of Ohzuku (JP 2002-042813, relying upon the English equivalent US 6551744 for translation) as applied to claim 1 above, and further in view of Miyasaka (US 6416902).

Ohzuku '390 modified by Ohzuku '813 teaches particles but does not disclose primary particles and secondary particles as claimed in Applicant's claim 9. However, Miyasaka discloses a lithium ion battery comprising a positive electrode with a mean grain size in the range of 3 to 15 um for secondary particles and in the range of 0.1 to 0.5 um for primary particles. The term secondary particle means a

particle consisting of aggregated primary particles (5:48-57). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have primary and secondary particles as taught by Miyasaka in the particles of Ohzuku '390 modified by Ohzuku '813 for the benefit of packing the primary particles between the secondary particles. It is noted that primary particles will be able to occupy void spaces between the secondary particles, and hence minimize void spaces.

Response to Arguments

Applicant's arguments filed 3/23/2010 have been fully considered but they are not persuasive.

Applicant argues that the particle having experienced rapid heating or rapid cooling includes a number of interfaces between crystal grains and between crystal domains. The differences in the interatomic distances of Ni-O, Mn-O, and Co-O, as described above, are not balanced at these interfaces, causing the generation of distortion stress. This results in the occurrence of a twining portion, thereby to produce the effect of the present invention.

Ni-Mn based active material, such as in JP "813, correspond to Example 1-3 in Table 4 (specification at page 52). Example 1-4 corresponds to Ni-Mn-Co based active materials in CL "390. Examples 1-1 and 1-2, which are formed by rapid heating and rapid cooling exhibit unexpectedly improved rate performance and a cycle performance.

Based on Table 4 of the instant application, the Examiner agrees with the Applicant that an active material formed with rapid heating/cooling has higher

performance than active material formed without rapid heating/cooling. However, the data are not commensurate in scope with the instant claimed invention since 1) the instant claims do not require rapid heating or cooling and 2) there does not appear to be a direct correlation between rapid heating or cooling with the formation of twining portions.

Applicant asserts in the arguments that rapid heating or cooling causes the generation of distortion stress, and thus contributes to twining portion. The Examiner respectfully disagrees. Examples 1-3 and 1-4, which performed in lower performance than Examples 1-1 and 1-2, were formed by mixing powdered lithium hydroxide, powdered nickel hydroxide, and powdered manganese oxyhydroxide. See instant Specification pg 50, 1st full par. Examples 1-3 and 1-4 were not made by coprecipitation, as was for Examples 1-1 and 1-2. Further evidence would be needed to determine that the twining portions are formed due to rapid heating or cooling.

The following comments are made:

The instant Specification pgs 17, 2nd and 3rd full par. states that the crystal lattice of LiNi1/2Mn1/2O2 has defects and disorder in the crystal structure. However, it is unclear if the defects are due to the coprecipitation method, or the rapid cooling and heating.

The instant Specification pgs 18-19 state that an equal ratio of nickel and manganese of 1:1 forms the superlattice arrangement of [~/3x~/3] R30°.

The instant Specification pg 26, 2nd full par. states that using lithium hydroxide, and not lithium carbonate, is advantageous in terms of crystallinity and controlling particle morphology.

The instant Specification pg 27, 1st par. states that amount of lithium is slightly increased when baking at a high temperature, when it is necessary to make primary particles after baking large (???), or when it is necessary to stabilize the crystal structure.

The instant Specification pg 28, 1st full par. states that it is preferred that rapid heating be performed at a rising temperature rate of not less than 7 °C/min and quenching be performed at a cooling rate of not less than 5 °C/min. Thereby, it is possible to control the grains within the primary particle as stated above.

Further evidence would bee needed to determine that the twining portions are formed as a result of rapid heating and cooling.

Pertinent prior art

Wada (US 5866279) discloses making an active material comprising a transition metal oxide formed by coprecipitation using rapid heating and cooling (8:45-62).

Cho (US 6241959) discloses making an active material comprising a transition metal oxide formed by coprecipitation using rapid heating and cooling (6:10-30).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cynthia Lee/
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795